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Department of the Army

"ESTIMATING LAND MINE C
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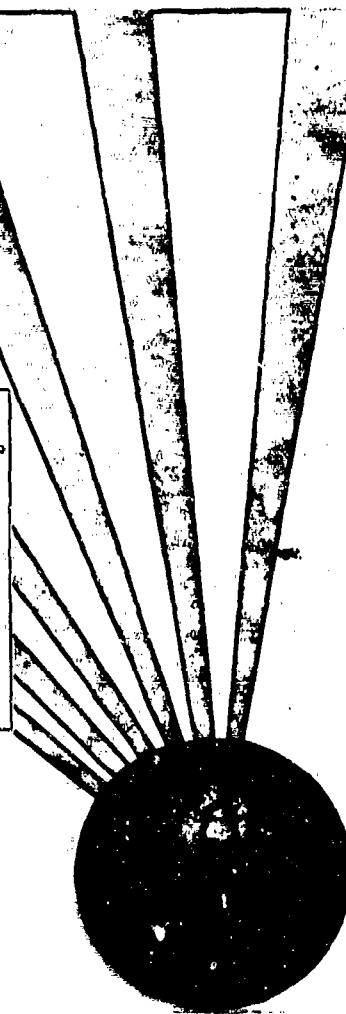
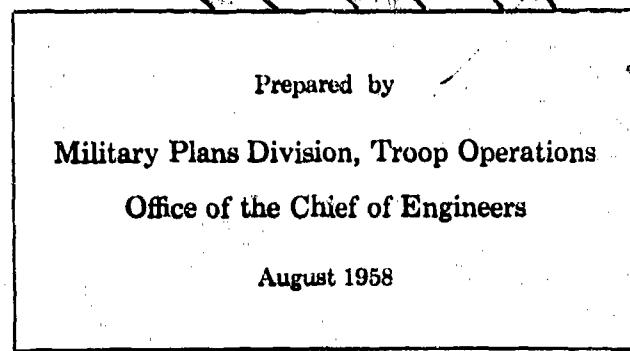
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**STAFF STUDY
ESTIMATING LAND MINE
OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING (U)**

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A - Discussion (SECRET)

Appendices

1 - Copy of DF, Comment No. 1, from DCSLOG to Chief of Engineers, subject "Land Mine Requirements" dated 17 March 1958 with 1 Inclosure, Memo For Record, file LOG/G1, 14 Mar 1958, subject: "Mine Warfare in The Penatomic Army, 1960-1965" (U) (CONFIDENTIAL)

2 - Extract of Supply Bulletin 38-26, 29 May 1956 (CONFIDENTIAL)

3 - Ratio of AP to AT Mines (CONFIDENTIAL)

4 - Requirement for Light Antitank Mines (CONFIDENTIAL)

5 - Requirement for Nonmetallic Antitank Mines (CONFIDENTIAL)

B - Draft Directive to the Chief of Engineers (CONFIDENTIAL)

C - Draft Directive to the Chief of Ordnance (CONFIDENTIAL)

Appendix 1 - Draft Change to Supply Bulletin 38-26, 29 May 1956
(CONFIDENTIAL)

ARMY ENGINEER STUDIES GROUP

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STAFF STUDY

ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING

1. PROBLEM. To develop procedures and factors for determining theater of operations mobilization requirements for land mines.
2. ASSUMPTIONS. Various assumptions essential to establishment of planning factors are covered in Annex A (DISCUSSION)
3. FACTS BEARING ON THE PROBLEM.
 - a. Certain background data concerning land mine requirements are contained in a study prepared by Military Plans Division, Troop Operations, Office of the Chief of Engineers, dated September 1957, subject: "Land Mine Requirements for Pentomic Units" (U) (SECRET)
 - b. On 11 March 1958, a briefing was presented by the Office of the Chief of Engineers to Lt. Gen. Magruder, DCSLOG, subject: "Land Mine Requirements for The Pentomic Army". Appendix 1 to Annex A contains a copy of a Memo For Record covering this briefing and recommendations approved by the DCSLOG.
 - c. This study has been prepared in response to a DF to OCE from DCSLOG dated 17 March 1958, subject: "Land Mine Requirements". A copy of this DF is contained in Appendix 1 to Annex A.
4. DISCUSSION. See Annex A.
5. CONCLUSIONS.
 - a. The mine day of supply factors contained in the current SB 38-26, 29 May 56, should be revised as indicated in Appendix 1 to Annex C. In summary this revision provides for:
 - (1) Reducing the day of supply factor for AT mines from 200 to 100.
 - (2) Reducing the ratio of AP to AT mines from 12:1 to 6:1.
 - (3) Eliminating the light AT mine.
 - (4) Changing the ratio of metallic to non-metallic mines from 3:2 to 9:1.

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b. OCO should:

(1) Utilize the new factors to estimate requirements during post D-Day periods.

(2) Add to the above requirements.

a. Theater mobilization requirements as estimated by OCE.

b. Any additional post D-Day requirements if determined by OCE to be necessary over and above SB estimates.

(3) Review SL requirements by all theater assets.

c. OCE should provide to OCO:

(1) Theater mobilization (pre D-Day) requirements.

(2) Any additional post D-Day requirements over and above SB estimates.

d. In addition, OCE should review annually the SB factors for mines and report to DCSLCG any recommended changes either in factors or overall procedures for estimating requirements. This review should follow within 2 months after the approval of the SL for the European theater.

6. RECOMMENDATIONS

a. That the conclusions in paragraph 5 be approved.

b. That the draft change to Department of the Army Supply Bulletin 38-26, 29 May 1956, at Appendix 1, Annex C, be approved.

c. That the draft implementing directives to the Chief of Engineers and the Chief of Ordnance at Annexes B and C be approved and dispatched.

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STAFF STUDY

**ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING**

ANNEX A

DISCUSSION

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DISCUSSION

1. PROBLEM. To develop procedures and factors for determining theater of operations mobilization requirements for land mines. The problem is restated here to emphasize that this study is restricted to operational requirements in theaters of operation.

2. ASSUMPTIONS.

a. The initial posture of U.S. forces in any war will be defensive. This implies that there will be a relatively high initial requirement for land mines in a given theater.

b. In the time period 1960-1965, Europe is the most likely area in which the United States will be committed to a general war. This implies that day of supply factors should be based primarily on requirements developed in support of campaign plans for the European theater.

c. Additional assumptions are developed in the discussion.

3. FACTS BEARING ON THE PROBLEM.

a. Department of the Army Supply Bulletin 38-26, 29 May 1956 (hereafter referred to as SB 38-26) is the current authorized supply bulletin for use in computation of worldwide mobilization requirements for Ordnance and Chemical ammunition and bulk allotment items such as land mines and demolitions. An extract of pertinent provisions of SB 38-26 is attached as Appendix 2 to Annex A.

b. The concept of land mine warfare in the period 1960-1965, as presented by OCE to the DCSLOG on 11 March 1958 was approved by the DCSLOG. (See Appendix 1, this Annex)

c. At the present time, the Chief of Ordnance is responsible for estimates of worldwide mobilization requirements for land mines. His office makes these estimates based on factors in SB 38-26, additional guidance furnished by DCSLOG, and estimates prepared by OCM.

d. The Chief of Engineers is currently responsible for estimating operational requirements for mines in these instances:

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- (1) Department of the Army Strategic Logistic Studies (hereafter referred to as DA SL's) based on assumed outline campaign plans furnished by DCSOPS.
- (2) Department of the Army contingency plans.
- (3) Department of the Army Engineer barrier and denial studies.
- (4) Special studies as assigned by DCSLOG.
- e. In addition to d above, although mines are Ordnance items of supply, OCE is also responsible for performing a technical review of requirements for Engineer items generated by DA, Theater, and Technical Service Class IV Operational Projects to include operational requirements for land mines therein.
- f. A study made by the Office of the Chief of Engineers in September 1957 and modified in February 1958, subject: "Land Mine Requirements for Pentomic Units (U)" (SECRET) included in its conclusions the following: Current procedures for computing land mine requirements for mobilization are unsatisfactory for these reasons:
- (1) Procedures are based on SB 38-26, which generates no mines during a mobilization period in a theater. Further, mine requirements generated by the factors of this supply bulletin vary directly with the number of divisions committed to combat and the expected intensity of the combat. These types of calculations may be satisfactory for ammunition items but are not valid for land mines unless modified in application. While the aforementioned factors contribute to overall mine requirements, other factors of at least equal importance but not considered by SB 38-26 are:
- (a) Tank trafficability of terrain.
- (b) Armor capability and known land tactics of an enemy.
- (c) Type of combat, i.e., defensive or offensive.
- Requirements are expected to be much greater during defensive phases, and the Supply Bulletin makes no distinction between offensive or defensive combat.

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(2) Current Ordnance Materiel Control Studies (hereafter referred to as MCS) do not credit theater land mine assets against mobilization requirements estimated for the theater.

(3) Instances have occurred wherein Ordnance MCS's have reflected a duplication of requirements for a particular theater by adding the requirements generated by SB 38-26 computations based on a DCSOPS Outline Campaign Plan, and requirements estimated by OCE and published in the Engineer Annex to a DA SL based on the same Outline Campaign Plan. This has resulted in an overstatement of requirements.

4. DISCUSSION.

a. OCE Method of Developing Mine Requirements for a Given Theater.

Since 1950, OCE, at the request of DCSOPS and SHAPE, has performed a series of Engineer barrier and denial studies covering an area in Central Europe from the Baltic Sea to the Adriatic Sea and Greece, and is presently completing such a study on Western Turkey. For the first four studies of this series, the terrain was analyzed to determine where mines could be most profitably employed in conjunction with natural features. General traces of terrain were selected and individual minefields were plotted, measured, and mine requirements computed. Since this is a very time-consuming technique, and it was decided that such studies at DA level should not be so detailed, this procedure was modified for the studies following the first four. An analysis of the completed barrier studies was made and general planning factors were developed. These factors can be keyed to the obstacle value of terrain, the scheme of maneuver, and the type of combat expected - offensive, defensive, or retrograde. Use of this technique requires the skill of an experienced military planner, for the keying of the general planning factors to terrain, etc., is principally a matter of judgment based on a knowledge of mines, mine warfare doctrine, and ability to evaluate obstacle value of terrain from maps and aerial photographs. This technique has been used to estimate mine requirements for DA SL's, contingency plans, barrier studies, and as a means of evaluating mine requirements included in Class IV Operational Projects.

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When used with a DCSOPS Outline Campaign Plan developed for DCSLOG use in DA SL's, this technique results in mine requirements which are largely dependent upon the number of defensive phases of the Campaign Plan. The European campaign plans to date have all called for holding or defensive operations during the first quarter following D-Day and for continued offensive combat thereafter, with no general defensive phases or defense lines indicated once the offensive has started. If future plans should add defensive phases following the initial holding operation, mine requirements would increase considerably over those which have been developed to date by OCE.

It is probable that few types of supply requirements are as difficult to estimate with any degree of accuracy as are mines, and it is certain that the OCE method of calculation is by no means precise. Nevertheless, the procedure is as reasonable and sound as can be developed - its weakness is simply the difficulty of relating abstract statements of mine warfare doctrine to combat situations which cannot be predicted with any degree of certainty.

b. Development of Appropriate Supply Bulletin Procedures and Factors for Estimating Operational Mine Requirements.

(1) During Combat Phases (Post-D-Day). The following advantages of a supply bulletin computation suggest that such a procedure be retained and used in the absence of detailed estimates for estimating mine requirements during the combat phase of a campaign:

- (a) It is the most simple method to apply. It does not require skill in evaluating the obstacle value of terrain.
- (b) It is the least time-consuming method.
- (c) It can be keyed to the number of divisions committed and the expected intensity of combat.
- (d) It can be applied to a campaign or periods of time for which no previously prepared campaign plan or requirements study exists or when time does not permit an analysis such as the method used by OCE.

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(2) During Mobilization Phases (Before D-Day). SB 38-26

does not presently generate requirements during a mobilization period preceding combat in a given theater. Operational requirements do not normally exist for items in SB 38-26 other than mines during a mobilization period. If a mobilization period occurs before combat is initiated, it follows that mines can and should be installed during this period, and these mines generally are not recoverable but must be considered expended. Given the assumption that any initial posture of U.S. forces in a theater will be defensive, an operational requirement is then created for relatively large quantities of mines prior to the initiation of combat. In consonance with the stated purpose of SB 38-26, a supply bulletin "Ammunition Day of Supply" procedure is applicable only to the combat phase. Conceivably mines could be handled as a special case in SB 38-26 and mobilization factors could be established for application prior to D-day. However, this would run contrary to other items in the SB, and, further, mobilization period requirements will vary so markedly with circumstances that a uniform rate of consumption is simply not an appropriate concept. Hence, it is considered that pre-D-day requirements must always remain a problem for individual examination, not amenable to SB methods of calculation.

(3) Influence of Mobilization Period on Combat Factors.

In developing a procedure and factors for estimating mine requirements during the combat phase, provisions must be made for two possible conditions- a combat phase preceded in the theater by a significant period of mobilization and a combat phase that commences with relatively no mobilization period preceding it. These two conditions produce differing requirements for mines during the early months of combat. With a mobilization period, the barriers can be installed before the combat phase and requirements during the combat phase are lowered. Without a mobilization period, units will be unable to execute barrier plans, that is, utilize mines, to the degree possible with a mobilization period, and must execute the barriers after combat has begun; in this circumstance

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overall mine requirements probably will be less than with a mobilization period, but the rate of consumption for several quarters following D-day will be higher. It is basically a matter of whether or not time is available to install the mines before the combat phase. Since either of the two conditions may exist, it follows that two sets of factors are required to compute requirements for the initial portion of the combat phase.

(4) Proposed Supply Bulletin Factors. In line with the preceding discussion it is considered that theater requirements for mines during the mobilization period should be determined in each case by individual study, using such data and factors as are appropriate to the plan or operation under study. For the post-D-day requirement, an average basic planning factor is proposed of 100 AT mines per division per day in intense combat, with the 1/3 and 2/3 reduction factors for normal and reduced combat still applicable. The figure of 100, although based on OCE requirement studies for various campaign plans, is somewhat of a compromise. For a single division during offensive operations it provides roughly for the replacement of the current basic lead about once a month-it is probably too high for offensive operations and it is definitely too low to provide enough mines during the year for the division to dig in completely behind a barrier line. The additional mines required during defensive phases should be estimated through special study for the mobilization period in the theater, or, if there is no mobilization period, by multiplying the figure of 100 by a factor of six for the first two quarters following D-Day. The factor of six was obtained from analysis of requirements studies prepared by OCE in support of campaigns with no theater mobilization period. In effect, it permits each division on the average to establish one strongly defended position. The proposed factors for AT mines are summarized below:

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FOR A THEATER WITH A MOBILIZATION PERIOD

<u>For Mobilization Period</u>	<u>For Quarters after D-Day</u>					
	1st	2nd	3rd	4th	5th	6th
Special study required	100	100	100	100	100	100

FOR A THEATER WITHOUT A MOBILIZATION PERIOD

1st	<u>For Quarters after D-Day</u>				
	2nd	3rd	4th	5th	6th
600	600	100	100	100	100

Factors for AP mines and comments on light mines and nonmetallic mines are covered in paragraph 4c below.

(5) Examples of Application. The conditions and factors described above are illustrated by two existing Outline Campaign Plans-2 (60) and 1 (60). Outline Plan 2 (60) is a general war in Central Europe preceded by a six months period of mobilization prior to the combat phase. Outline Plan 1 (60) is a limited war in the Middle East not preceded by a mobilization period. Total mine requirements for both plans previously estimated by OCE utilizing the detailed method described in paragraph 4a above are summarized in Tables 2 and 3 and are contrasted with results obtained from the proposed supply bulletin factors. In order to keep this portion of the discussion brief, AT mine requirements only are shown.

(a) For Table 2 (Central Europe) line 1 reflects the AT mines generated by an OCE analysis of the Outline Plan and intended to cover total mine requirements. Line 2 reflects total AT mines generated by the current SB 38-26 and troop deployment tables of Outline Plan 2 (60) for Central Europe. Line 3 is the sum of these two estimates.^{1/} Line 4 is the OCE estimate for the mobilization period and line 5 is the requirement generated by the proposed supply bulletin procedure and factors. Line 6 is the total requirement generated by

^{1/} Lines 1 and 2 are not truly additive since line 1 was intended by OCE to cover total requirements. However, both lines apparently were added in MCS's, as indication of duplication of stated requirements.

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the proposed method. The total generated by the proposed factors is 112% of the total generated by the OCE detailed study. The proposed factors provide results reasonably consistent with detailed study.

(b) For Table 3 (Middle East), line 1 reflects the total AT mines generated by an OCE analysis of the Outline Plan. Line 2 reflects total AT mines generated by the current SB 38-26 and the troop deployment tables of Outline Plan 1 (60). Line 3 is the sum of these requirements. Line 4 illustrates the absence of requirements generated by OCE detailed study since this campaign plan has no mobilization period. 2/ Line 5 reflects the total AT mines generated by the proposed supply bulletin method. The total of line 6 is 115% of the OCE estimate in line 2, and is therefore consistent with detailed study results.

2/ This assumes that all calculations during combat phases are by supply bulletin factors instead of detailed campaign analysis.

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TABLE 2
A COMPARISON OF RESULTS OF METHODS OF ESTIMATING MINE REQUIREMENTS
FOR A GENERAL WAR IN CENTRAL EUROPE SL 2 (60)
(ANTITANK MINES)

METHOD	QUARTER						TOTALS
	(H-Day) 1	2 (D-Day)	3	4	5	6	
Present:							
1. OCE	661,000	996,000	164,000	207,000	76,000	71,000	2,175,000
2. SB 38-26	0	0	268,000	412,000	426,000	430,000	1,556,000*
3.							3,731,000CP
Proposed:							
4. OCE	661,000	996,000	0	0	0	0	1,657,000
5. New SB 38-26	0	0	134,000	216,000	213,000	215,000	778,000*
6.							2,435,000**
PROPOSED TOTAL REQUIREMENTS							

* The difference between 1,556,000 and 778,000 is a true reduction in requirements due to the new factors.

** The difference between 3,731,000 and 2,435,000 reflects the above saving plus the elimination in duplication between OCE and OCO.

NOTE: Theater assets are not considered for the purposes of this table - these are pure requirements.

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TABLE 3

A COMPARISON OF THE RESULTS OF METHODS OF ESTIMATING MINIMUM REQUIREMENTS
FOR A LIMITED WAR IN THE MIDDLE EAST

METHOD	(P-247)	COUNTER				TOTAL
		1	2	3	4	
Present:	1. OCE	155,000	248,000	-	-	403,000
	2. SB 38-26	56,000	74,000	94,000	54,000	278,000
	3.					681,000
				PREVIOUS TOTAL REQUIREMENTS		
Proposed:	4. OCE	0	0	0	0	0
	5. SB 38-26	168,000	222,000	17,000	27,000	464,000
	6.					464,000
				PROPOSED TOTAL REQUIREMENTS		

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c. Special Studies Versus SB Utilization. The preceding discussion, (paragraph 4b(2)) indicated that theater mobilization period requirements were not amenable to SB treatment and that special study was necessary in each case. For periods following D-Day, SB factors were proposed which are reasonably consistent with detailed studies to date. However, future SL's or contingency plans may involve new situations or phasing of operations after D-Day which introduce new requirements not considered in establishing these factors. Therefore, as a matter of routine OCE should, when time permits, analyze the campaign plan for each requirements study to determine if mine requirements after D-Day will vary markedly from SB computations. If so, OCE should provide OCO with increments (or decrements) to the requirements generated by the SB computations. Due to the inherent lack of accuracy in mine estimates, such differences are not significant unless they approach a figure of 25%.

d. Discussion of Other Mine Factors in SB 38-26. For simplicity the discussion to this point has been limited to AT mines in general. Other factors related to mines contained in the supply bulletin are:

(1) Ratio of antipersonnel mines to antitank mines. This item is discussed in Appendix 3. In summary, it concludes that the ratio of AP to AT mines should be only 6:1 instead of 12:1 as currently stated. The result combined with the proposed reduction in AT mines is to provide only one-fourth the average daily figure in the current SB.

(2) Utilization of light AT mines. This item is discussed in Appendix 4. In summary, it is concluded that there is . . . requirement for a light AT mine and that as a result the T-20 developmental mine has already been deleted from the R & D program.

(3) Ratio of heavy metallic antitank mines to heavy non-metallic antitank mines. This item is discussed in Appendix 5. In summary, it is concluded that the ratio of metallic to nonmetallic AT mines should be changed from the current figure of 3:2 to 9:1. The

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result is to provide only one-fourth the relative percentage of non-metallic mines contemplated by the current factors.

e. Theater Mine Stocks as Assets Against Mobilization Requirements.

(1) Active theaters generally have on hand stocks of land mines for approved operational projects related to theater emergency plans. Up to the present time in mobilization planning, no credit has been taken for these mines against mobilization requirements for the theater. It is obvious that at least a portion of these mines should be considered as mobilization assets, but the determination of the appropriate portion is inherently complicated because of the lack of any relationship between the theater emergency plan and the campaign plan upon which mobilization requirements are based.

(2) This problem is illustrated by the situation in the European theater. EUCOM now has an approved operational project in connection with a theater contingency plan which authorizes stockage of 2,203,600 AT mines. (Current EUCOM AT mine assets are approximately 1,900,000 - the comparisons made in the remainder of this discussion assume that the AT mines currently authorized by Section 9, Project ARMY-EUCOM-GEN-102-50-OP (2,203,600 AT mines) will become the theater AT mine asset position by 1961.) By coincidence, current mobilization requirements for the same theater are almost identical and amount to 2,175,000 AT mines (under proposed SB factors this would increase to 2,435,000 - See Table 2).

(3) There are major differences in the concepts of the plans behind these two sets of requirements. The contingency plan calls for about 700,000 mines to be employed forward of the Rhine and for the remainder to be employed in a series of successive barrier lines behind the Rhine. These lines are to be emplaced by a five-division force utilizing Infantry, Engineers, and a large number of civilian laborers.

(4) By contrast, under SL 2(60) the mines are all planned

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for employment forward of the Rhine. Fewer barrier lines are involved because the holding and limited withdrawal area covers much less ground than in the contingency plan. Approximately 18 divisions are involved before the bulk of these mines are emplaced, and 38 divisions are deployed before the end of the first year. It would appear that 38 divisions should use more mines than five divisions, but the fact that requirements are equivalent is due to the opposing operational concepts: size of area over which the defensive phases take place; use of civilian laborers in one case and not in the other; locations all forward of the Rhine in one case and principally behind it in the other. Another major difference in the two concepts is the timing. Under the SL the mines are used extensively for six months prior to D-Day with lesser but still substantial quantities used during the first quarter after D-Day. For the contingency plan the mines are emplaced from about a week before D-Day to D + 2 months.

(5) There are two general methods which could be followed in crediting theater assets against mobilization requirements. The first is simply to credit all mines in theater stocks against the requirements. This method has the virtue of simplicity. In addition, it is realistic because the mines in the theaters obviously are those which will actually be used in the initial stages of any war in the theater, whether executed under a contingency plan or under the somewhat artificial concepts of the campaign plan accompanying the SL. It carries with it some danger if theater forces are over-run and mines lost which otherwise were planned to be available to support mobilization forces. However, this same danger applies to any prestockage, whether it is against an approved operational project or against mobilization requirements. Since mobilization requirements for the European theater (under the proposed SB factors) total 2,435,000 , crediting the operational project of 2,203,600 leaves an outstanding mobilization requirement of 231,400 AT mines under this method.

(6) A second method involves attempting to phase the contingency plan with the mobilization plan and off-setting only a

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corresponding portion of the mobilization requirements. The DF which requested this study suggested off-setting requirements through D + 2 months, presumably because the contingency plan carried through this period of time. If this is done, the net mobilization requirement is 689,000 AT mines (Table 2, one-third of the 3rd quarter, plus all of the 4th, 5th, and 6th quarters). However, D-day of the contingency plan might well be considered to correspond to M-day of the mobilization plan since mine field activity starts on M-day under the latter plan - if so, theater assets offset roughly the first quarter of the mobilization plan. If this latter phasing is utilized, net mobilization requirements for the SL are 1,774,000 mines.

(7) For simplicity and because of the inherent lack of relationship between contingency plans and mobilization plans, it is believed appropriate to credit all theater mine assets against mobilization requirements.

5. CONCLUSIONS.

a. The mine day of supply factors contained in the current SB 38-26, 29 May 56, should be revised as indicated in Appendix 1 to Annex C. In summary, this revision provides for:

- (1) Reducing the day of supply factors for AT mines from 200 to 100.
- (2) Reducing the ratio of AP to AT mines from 12:1 to 6:1.
- (3) Eliminating the light AT mine.
- (4) Changing the ratio of metallic to nonmetallic mines from 3:2 to 9:1.

b. OCO should:

- (1) Utilize the new factors to estimate requirements during post D-Day periods.
- (2) Add to the above requirements:
 - (a) Theater mobilization requirements as estimated by OCE.

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(b) Any additional post D-Day requirements if determined by OCE to be necessary over and above SB estimates.

(3) Reduce SL requirements by all theater assets.

c. OCE should provide to OCO:

(1) Theater mobilization (pre D-Day) requirements.

(2) Any additional post D-Day requirements over and above SB estimates.

d. In addition, OCE should review annually the SB factors for mines and report to DCSLOG any recommended changes either in factors or over-all procedures for estimating requirements. This review should follow within 2 months after the approval of the SL for the European theater.

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STAFF STUDY

ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING

APPENDIX 1

ANNEX A

COPY OF COMMENT NO. 1, DISPOSITION FORM, FROM DCSLOG TO
CHIEF OF ENGINEERS, SUBJECT: "LAND MINE REQUIREMENTS"
DATED 17 MARCH 1958, W/1 INCLOSURE, MEMO FOR RECORD
ODCSLOG, SUBJECT: "MINE WARFARE IN THE PENTOMIC ARMY 1960-1965"
DATED 14 MARCH 1958, (CONFIDENTIAL)

CONFIDENTIAL

DISPOSITION FORM

FILE NO. LOG/G1	SUBJECT Land Mine Requirements		
TO Chief of Engineers	FROM DCSLOG	DATE 17 Mar 1958	COMMENT NO. 1
		Expiration Date: 10 July 1958	
		Major J. F. Morey/56576	

1. At the conclusion of the briefing on the Role of Land Mines in the Pantomic Army (copy Memorandum for Record attached) the DCSLOG directed a study be made to revise the current day of supply data used in developing mobilization requirements. He is convinced that currently expressed mobilization requirements contain some duplication and overlap which should be corrected.

2. The Chief of Engineers will:

a. Study the requirements for land mines, in coordination with major interested agencies based on the following criteria:

(1) Current USAREUR Barrier Plan will fulfill theater mine requirements through D+2 months.

(2) Balance of USAREUR and other world-wide requirements will be based on the selected method resulting from the aforementioned study.

b. Submit the study together with proposed changes in the ammunition day of supply (SB 38-26) and be prepared to brief the DCSLOG on or about 30 June 1958.

BY DIRECTION OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS:

1 Incl
MPR dtd 14 Mar 58,
"Mine Warfare in the
Pantomic Army, 1960-
1965" (cbn cy)

/s/ William H. Commerat
Colonel, GS
Chief, Requirements Division

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HEADQUARTERS
DEPARTMENT OF THE ARMY
Office of the Deputy Chief of Staff for Logistics
Washington 25, D. C.

LOG/G1

14 March 1958

MEMORANDUM FOR RECORD

SUBJECT: Mine Warfare in the Pentomic Army, 1960-1965

1. On 11 March 1958 DCSLOG was briefed on the above subject: The following key personnel were present:

Maj Gen N. D. Moore, Director of Plans and Programs, DCSLOG
Brig Gen R. D. Mayer, Asst Director of Plans and Programs, DCSLOG
Brig Gen K. A. McCrimmon, ACofE for Troop Operations
Col W. H. Commerat, Chief, Requirements Division, DCSLOG
Col R. H. Tiffany, Deputy Chief, Requirements Division, DCSLOG
Col E. R. James, Chief, Equipment Review Br, Rqmts Div, DCSLOG
Col D. S. Parker, Army Map Service, OCE (Briefing Officer)
Lt Col C. P. Reed, S&D Division, DCSLOG
Lt Col R. J. O'Neil, Plans, Division, DCSLOG.
Major G. A. Schraeder, Army Map Service, OCE
Major J. F. Morey, Equipment Review Br. Requirements Div, DCSLOG

2. The briefing was presented in response to General Magruder's questions regarding the role of the land mines in the Pentomic Army, and the estimated quantitative requirements for land mines under conditions of atomic warfare.

3. The Engineer portion of the briefing presented by Colonel Parker was based on the results of an OCE study, "Mine Warfare in the Pentomic Army, 1960-1965," dated September 1957 and revised 29 January 1958 summarized as follows:

a. An analysis of the battlefield of the era 1960-1965 in relation to U.S. and Soviet tactical doctrine, together with an analysis of the effect, both tactical and physical, of atomic weapons in the battle, support the continued profitable employment of land mines.

b. Considering the cost of atomic weapons and the radii of effects against mine materiel (fuzes for which may be successfully modified to withstand atomic overpressure) atomic weapons will seldom be employed solely in a mine breaching. Breaching by atomic cratering will be of remote threat, ruled out by the resultant contamination of the battlefield.

c. Requirements for land mines are considerably overstated. There has been a duplication of requirements involving (1) use of requirements generated in logistics studies (Class IV) to generate logistics studies, (2) barrier plans (Class IV), and (3) operational mines based on day of supply rates.

d. It was concluded, based on Engineer Study:

a. That current mine warfare doctrine is valid under Pentomic organizational concepts.

b. That the Pentomic Army will have the capability of emplacing the quantities of mines contemplated in current plans and in calculated mobilization requirements.

c. That currently expressed mobilization requirements for mines contain some duplication and overlap which should be corrected.

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SUBJECT: Mine Warfare in the Pentomic Army, 1960-1965

d. That for any given planning period only one method of requirements computation be used.

5. As a result of these conclusions it was recommended that DCSLOG:

a. Reaffirm the validity of current mine warfare doctrine.

b. Direct revision of present procedures for calculation of mobilization mine requirements to eliminate duplication.

6. The second part of the briefing, presented by Major Morey, was a comparison of the two methods of computations (current and proposed) and relating these requirements to assets currently on hand or planned for future procurement. This comparison indicated an overall reduction in mine requirements and that available assets will essentially meet these reduced requirements. However, the adequacy of the metallic mines to most non-metallic requirements will have to be resolved.

7. Based on the conclusion of the Engineer Study that use of atomic weapons will not materially affect the role of land mines in the Pentomic Army and the stated capability of USAREUR troops to effectively utilize the quantity of mines requested, it was recommended that DCSLOG approve the mine requirements for the proposed USAREUR Barrier Plan.

8. General Magruder approved:

a. The concept of current mine warfare doctrine.

b. Proposed USAREUR Barrier Plan with the following stipulations:

(1) Barrier Plan requirements will support the war plan through D/2 months.

(2) Remainder of the requirements will be based on day of supply data or strategic study method of computations.

c. Directed a study be made of the "Day of Supply" and Engineer Strategic methods of computation to develop the most accurate system of computing mine requirements for Europe after D/2 months and other world-wide mobilization requirements.

J. F. MOREY
Major, GS
Major Equipment Section
Equipment Review Branch
Requirements Division, DCSLOG

DISTRIBUTION:

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STAFF STUDY

**ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING**

APPENDIX 2

ANNEX A

EXTRACT OF DEPARTMENT OF THE ARMY SUPPLY BULLETIN 38-26, 29 May 1956

(CONFIDENTIAL)

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EXTRACT OF DEPARTMENT OF THE ARMY SUPPLY BULLETIN 38-26,

29 MAY 1956

* * * * *

1. **PURPOSE.** This bulletin establishes ammunition day of supply applicable to combat conditions for the United States Army.

2. **DEFINITIONS.**

a. Ammunition Day of Supply is the estimated average quantity of ammunition required per day to sustain operations in an active combat theater. It is expressed in terms of rounds per day per weapon in the hands of troops for ammunition items fired by weapons and in terms of other units of measure for bulk allotment of ammunition items. Proportion of types of rounds, fuses, and extra fuses is included where applicable.

b. "Normal" Combat Ammunition Day of Supply includes all types of combat activity experienced over a prolonged period in an active theater. There will be short periods of very heavy fighting, longer periods of heavy and moderate fighting and substantial periods of light fighting. For anti-aircraft "normal" combat implies the condition in which both sides have short periods of local air superiority.

c. "Intense" Combat Ammunition Day of Supply is a much higher order in intensity than "normal" combat as defined above. There will be greater periods of very heavy and heavy fighting. Divisions will seldom, if ever, be withdrawn from the line. Ammunition expenditure will be at rates rarely encountered over similar periods, and the fighting will involve massive assaults of a fury seldom met by American forces. The numerical equivalent for "intense" combat for all material consumption is 150 percent of "normal" combat. For anti-aircraft "intense" combat implies the condition in which the enemy is conducting a major air offensive or is exercising a general air superiority.

d. "Reduced" Combat Ammunition Day of Supply is analogous to occasions in which a unit moves from a training status to a full combat status during a month and vice versa. It implies a period of little or no combat, and a period of full combat. The numerical equivalent for "reduced" combat for all material consumption is 50 percent of "normal" combat. For anti-aircraft "reduced" combat implies a condition in which friendly forces exercise a general air superiority but in which the enemy still conducts frequent air attacks.

3. **AUTHORIZATION.** The ammunition day of supply herein published is authorized for use effective upon date of this publication.

4. **USE.**

a. This table cites intense combat rates. It will be used by the Department of the Army in the computation of worldwide mobilization requirements. "Normal" combat will be computed at 2/3 of published rates. "Reduced" combat will be computed at 1/3 of published rates.

b. This table may be used as a guide upon which to compute pre-D-Day theater stocks.

c. This table has no application to unit basic load or to stockage below theater level.

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7. ORDNANCE AMMUNITION WEAPONS AND BULK ALLOTMENT ITEMS.

	<u>Unit</u>	<u>Units Per Div.</u>
		<u>Per Day</u>
Mine, antipersonnel, Frag. directional (Claymore)	Ea	70
Mine, antipersonnel HE, bounding (metallic)	Ea	800
Mine, antipersonnel HE, nonbounding (nonmetallic)	Ea	1,600
Mine, AT HE hvy (metallic)	Ea	100
Mine AT HE hvy (nonmetallic)	Ea	80
Mine, AT HE light (metallic)	Ea	20

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**ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING**

APPENDIX 3

ANNEX A

RATIO OF ANTIPERSONNEL MINES TO ANTITANK MINES

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RATIO OF AMMUNITION TO ANTI-TANK MINES

1. An analysis of the present ammunition day of supply factors pertaining to land mines that are published in Supply Bulletin 38-26 reveals the following: (See Appendix 2, Annex A for an extract of Supply Bulletin 38-26)

a. The Supply Bulletin contains these ratios:

AP to AT	12 to 1
Heavy AT to Light AT	9 to 1
Metallic AT to Nonmetallic AT	3 to 2
AP Bounding to AP Nonbounding	2 to 1

b. Total AT mines per division per day:

- (1) Intense combat 200
- (2) Normal combat 133 1/3
- (3) Reduced combat 66 2/3

c. Total AP mines per division per day. (does not include 70 "Claymore"):

- (1) Intense combat 2,400
- (2) Normal combat 1,600
- (3) Reduced combat 800

2. Current mine warfare doctrine envisions the employment of AT and AP mines both in mixed and in separate (AT-only, AP-only) fields. The mixed field is the predominating type. Mixed fields are installed in these ratios:

- a. 12 AP to 3 AT (4 to 1 ratio) Barrier minefield density.
- b. 12 AP to 1 AT (12 to 1 ratio) Defensive minefield density.
- c. 6-12 AP to 1 AT (6-12 to 1 ratio) Protective minefield density.

3. Although AT-only or AP-only minefields can be installed, such use will usually be restricted to special cases which have negligible influence on an overall ratio of AP to AT mines.

4. The largest quantitative requirement for AT mines is generated by barrier-type-minefields of 4 AP to 1 AT ratio. The next most

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significant quantitative requirement for AT mines is generated by the defensive-type minefield with a ratio of 12 AP to 1 AT.

5. Soviet ground combat tactics indicate that they plan to rely heavily on large-scale use of tanks and motorized units, supported by strong dismounted forces. This increases the relative importance of AT mines. AP mines will be used principally to make AT mines more difficult to remove by inflicting casualties on supporting dismounted infantry and thereby stripping enemy armored units of this support.

6. Only in rare cases of planning at Department of Army level can specific requirements for AP-only minefields be estimated. The general techniques used by the Office of the Chief of Engineers is to estimate the total trace of mixed minefields of each type (barrier, defensive, and protective) that will be required in a specific campaign and apply the ratios in paragraph 2 above to estimate total quantities. Results of studies by this office involving estimation of mine requirements indicate that, for general planning purposes, a more appropriate ratio than 12AP mines to 1 AT mine is 6 AP mines to 1 AT mine.

7. In a letter, subject: "Proportionate Requirements for Various Types of Land Mines", dated 9 April 1954, file AG 470 GOT, from Headquarters, USAREUR to the Assistant Chief of Staff, G3 Operations, Department of the Army, it was recommended that "* * a ratio of six to one be established for antipersonnel and antitank mines for planning and procurement purposes".

8. The present SB 38-26 lists a factor of 70/division/day (intense combat) for the M-18 Claymore AP mine. This factor is not changed by this study and is not included in any discussion relating to a ratio of AP to AT mines. The Claymore is not the same type AP mine as the other two types - metallic bounding and nonmetallic nonbounding - and was not designed to replace either type in a minefield. The Claymore was designed to fill the gap between extreme hand grenade range and minimum mortarm range. It is command fired and possesses directional fragmentation

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characteristics. For these reasons, the Claymore is not well suited for use in conventional mixed minefields. However, this is not meant to imply that there is no requirement for this particular mine, rather that it cannot be properly considered in the same light as other AP mines.

SUBCONCLUSION

The ratio of AF mines to AT mines (not including the Claymore) in Department of the Army Supply Bulletin 38-26, 29 May 1956, should be changed from 12:1 to 6:1.

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ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING

APPENDIX 4

ANNEX A
REQUIREMENT FOR LIGHT ANTITANK MINES

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REQUIREMENT FOR LIGHT ANTITANK MINES

1. The only light metallic AT mine presently in the system is the M7 A2, type-classified as limited-standard. This mine contains only 3.5 pounds of explosive, and when individually installed, is ineffective against modern tanks. Although it can damage wheeled vehicles, and when installed in multiples of three to five in a single hole it can damage tanks, it is inefficient utilization of material, manufacturing effort, and installation effort to produce and install an AT mine of such limited destructive capability. AT mines are installed to damage tracked vehicles. Damage incurred by wheeled vehicles is a bonus effect. AT mines are seldom employed principally for anti-vehicular purposes.
2. The development of the T-20 which is an improved version of the light AT mine has been discontinued and is now deleted from the R & D program.
3. The sole advantage of the M7 A2 is, therefore, its light weight. However, this advantage is achieved only by a corresponding loss of effectiveness.
4. A limited requirement for this type mine may exist for unconventional warfare purposes, but existing stocks should be more than adequate for this purpose.
5. A slight increment of effort will install a mine such as the M-15 or M-19 heavy AT mines or the T-29 developmental "Tank Killer" mine. The light AT mine is relatively ineffective when compared to these heavy mines.

SUBCONCLUSION

No significant requirement for a light AT mine exists for normal combat forces which cannot be better satisfied by a heavy AT mine. The light AT mine should be deleted from Department of the Army Supply Bulletin 38-26.

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FOR MOBILIZATION PLANNING**

APPENDIX 5

ANNEX A

REQUIREMENT FOR NONMETALLIC ANTITANK MINES

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REQUIREMENT FOR NONMETALLIC ANTITANK MINES

1. In their initial development practically all land mines contained several metal components. Accordingly, mine detectors were designed to locate metals buried at practical mining depths. This brought about the development of nonmetallic mines and gave these mines an initial advantage due to the limited capability of mine detectors designed to detect metal components. This advantage has diminished as better small metals detectors have been developed.

2. Soviet commanders in WW II consistently accepted the losses inherent in overrunning German minefields. Should this technique prevail, nonmetallic mines would possess no advantage over metallic mines. This Soviet technique is among the factors that prompted the Second Mine Warfare Panel to recommend the present barrier minefield density as a minimum barrier density. Properly emplaced, sited, and defended, barrier minefields are capable of extracting prohibitive losses from an "over-running" assault force.

3. The judicious employment of nonmetallic mines offers the following advantages to employment of metallic mines alone:

a. The enemy is forced to accept the possibility that he cannot locate our nonmetallic mines with electronic detectors as rapidly and as effectively as he can locate metallic mines with detectors. He must be prepared to accept delay or diversion or choose to pay the price for over-running the mined area (if he relies on electronic detectors.)

b. Individual or small groups of nonmetallic mines can be more effective than metallic mines. Judicious employment of small quantities of nonmetallic mines can cause the enemy to believe that he will frequently encounter these mines.

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4. Factors which tend to decrease the advantage of nonmetallic mines include the following:

a. Metallic mines can deliver metal projectiles against targets. Nonmetallic mines cannot employ the highly effective plate charge as in our T-29 AT mines.

b. To be wholly effective, ancillaries for nonmetallic mines must also be nonmetallic. This gives an advantage to metallic mines because it is easier to develop fuzes and countermeasure devices for metals.

c. In any situation where the enemy chooses to make an assault breaching by any means other than electronic detection, nonmetallic mines offer no advantages over metallic mines and metallic mines are cheaper and more effective since they can deliver metal projectiles against the targets.

d. A cost comparison of the present standard U.S. heavy AT metallic (M-15) and nonmetallic (M-19) mines shows that the cost of the M-15 is approximately 2/3 that of the M-19 (\$15.30/24.00).

e. Nonmetallic mines are presently more difficult to recover than metallic mines. This can increase delay to U.S. forces passing through friendly minefields at points other than gaps and lanes by use of electronic detectors. (This situation probably will only be temporary. Development of self-sterilizing or command-sterilizing fuzes and/or a detector that detects explosives rather than metals or ground anomalies can alleviate this situation.)

f. Nonmetallic mines, like all other mines, can be readily located if not completely concealed from visual observation. Experience has shown that it is difficult to adequately conceal an entire minefield.

g. Mine warfare countermeasure developments require constant anticontrolmeasure development. This task is made easier if the required devices can exploit the use of metals, a course of action not possible with nonmetallic mines.

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h. Both metallic and nonmetallic mine detectors can be rendered ineffective to varying degrees by use of nails and other metallic scrap in minefields. The degree of ineffectiveness is dependent upon several factors, including type of detector, local soil conditions, and the amount, type, size, etc., of the nails and metallic scrap used. This is another condition that favors the use of cheaper metallic mines where the effectiveness of the mines are otherwise about equal.

SUBCONCLUSION

Nonmetallic mines do not offer sufficient advantages in employment over metallic mines to justify their procurement and utilization on a comparable scale. Any ratio established must be on an arbitrary basis, but it appears that if 10% of all AT mines are nonmetallic this will provide an adequate number for deception and keeping the enemy guessing as to the type of mine he may encounter. Therefore, the ratio of metallic AT mines to nonmetallic AT mines in Supply Bulletin 38-26 should be changed from 3:2 to 9:1.

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**ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING**

ANNEX B

DRAFT DIRECTIVE TO THE CHIEF OF ENGINEERS

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FILE NO.

SUBJECT: Method of Estimating Land
Mine Operational requirements
for Mobilization Planning

TO: Chief of Engineers

FROM: DCSLOG

DATE: COMMENT NO. 1

1. Reference: Staff Study, subject same as above, prepared by your office, June, 1958.

2. Recommendation and conclusions of referenced study are approved.

3. Accordingly, the Chief of Engineers will:

a. Estimate operational requirements for land mines for pre-D-Day theater mobilization periods in DA Outline Campaign Plans, DA Contingency Plans, and special plans as assigned.

b. Perform an annual review of the factors for mines in DA Supply Bulletin 38-26 and report to this Office any recommended changes either in factors or overall procedures for estimating requirements. This review will be performed within two months of the approval of the Strategic Logistic Study for the European Theater.

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STAFF STUDY

**ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING**

ANNEX C

DRAFT DIRECTIVE TO THE CHIEF OF ORDNANCE

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FILE NO.

SUBJECT: Method of Estimating Land Mine
Operational Requirements for
Mobilization Planning

TO: Chief of Ordnance

FROM: DCSLOG

DATE:

COMMENT NO.

1. Reference: Staff Study, subject same as above, prepared by Office, Chief of Engineers, June 1958.
2. Recommendations and conclusions of referenced study are approved.
3. Accordingly, the Chief of Ordnance will:
 - a. Take necessary action to effect publication of a change to DA Supply Bulletin 38-26, 29 May 1956 (an approved draft of this change is attached as inclosure 1).
 - b. Estimate operational requirements for land mines for the combat phase (post D-Day phase) of all DA Outline Campaign Plans, DA Contingency Plans, and other special plans as assigned. The procedure and factors contained in the draft change to DA SB 38-26 will be utilized for these estimates.
 - c. Continue to estimate all requirements, other than operational, for land mines.
 - d. Add to operational requirements estimated in accordance with paragraph b above:
 - (1) Theater mobilization (pre-D-Day) requirements as estimated by OCE and approved by this office.
 - (2) Any additional theater post-D-Day operational requirements as estimated by OCE.
 - e. Reduce gross theater mobilization requirements by offsetting all theater assets against these requirements.

2 Incls

1- Draft change to DA SB 38-26

2- Copy of DF to Cof Engrs

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STAFF STUDY

ESTIMATING LAND MINE OPERATIONAL REQUIREMENTS
FOR MOBILIZATION PLANNING

APPENDIX 1

ANNEX C

DRAFT CHANGE TO DEPARTMENT OF THE ARMY
SUPPLY BULLETIN 38-26, 29 MAY 1956 (CONFIDENTIAL)

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PROPOSED CHANGES TO PARAGRAPH 4 OF SECTION I AND PARAGRAPH 7b
OF SECTION II, DEPARTMENT OF THE ARMY SUPPLY BULLETIN 38-26
29 MAY 1956

1. Paragraph 4: Section I, is changed as follows:

* * * * *

4. Use. a. (Not changed)

* * * * *

d. (Added) The following procedure applies to computations
of land mines only:

(1) For computation of requirements for a campaign in
a theater preceded by a period of mobilization in the theater, USE
THE FACTORS AS SHOWN.

(2) For computations for a campaign in a theater not
preceded by a period of mobilization in the theater, MULTIPLY FACTORS
IN THE TABLE BY 6 FOR THE FIRST SIX MONTHS OF THE COMBAT PERIOD. THEREAFTER
USE THE FACTORS AS SHOWN.

(3) Reduction of "intense" combat factors for "normal"
and "reduced" combat applies.

* * * * *

2. Paragraph 7b, Section II, is changed as follows:

* * * * *

7. Ordnance Ammunition Weapons and Bulk Allotment Items.

Units per division
per day

* * * * *

(Delete)

Mine, antipersonnel, Frag. directional
(Claymore) Ea. 70

* * * * *

Mine, antipersonnel, HE, bounding
(metallic) Ea. 800

Mine, antipersonnel, HE, nonbounding

(non metallic) Ea. 1,600

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Item	Units	Units per division <u>per day</u>
Mine, AT HE hvy (metallic)	Ea.	100
Mine, AT HE hvy (nonmetallic)	Ea.	80
Mine, AT HE light (metallic)	Ea.	20

* * * * *

(Added)

Mine, antipersonnel HE, bounding (metallic)	Ea.	200 <u>1/</u>
Mine antipersonnel HE, nonbounding (nonmetallic)	Ea.	400 <u>1/</u>
Mine, antipersonnel, Frag. directional (Claymore)	Ea.	70 <u>1/</u>
Mine, AT HE hvy (metallic)	Ea.	90 <u>1/</u>
Mine, AT HE hvy (nonmetallic)	Ea.	10 <u>1/</u>

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1/ See paragraph 4d, Section I, for application of these factors.

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